According to the author of this article there are three groups of specialized nutritional supplements which are most important regarding problems connected with female physiology: (1) lipotropic factors, (2) anabolizing agents, and (3) contraceptives. The problems of the specialized nutrition of women athletes can be solved by (1) increasing the muscle mass while decreasing the fat layer by making body fat oxidize itself through aerobic strength work, together with a relative deficit of carbohydrates and the stimulation of muscle protein synthesis with a complex of protein and amino acid substrate products, B group vitamins and anabolizing agents, and (2) by the regeneration of the functional state of the organism of a female athlete in the post-natal period and during breastfeeding (initial aerobic loads, carbohydrates deficit, lipotropic agents, organism cleansing, application of the aerobic strength bloc).

Sexual dimorphism, and the physiological peculiarities of the female organism connected with it, determine many specific features, not only of the training process of top women athletes, but also of corresponding aspects of their nutrition and use of necessary nutritive supplements. These peculiarities include a lower haemoglobin content and the necessity to raise the Hb level in the first half of the menstrual cycle, the female type of muscle and body fat distribution, the increased share of the work carried out by the muscles while burning the fat layer, the prevention of unwanted pregnancy and the recovery in the post-natal period. Table 1 illustrates these specific features in more detail (according to YORDANSKAYA 1995 with modifications).

One of the most distinctive tendencies in women's athletics is the rapprochement of their biological indicators to similar parameters of men athletes. Analysis of the anthropometric indicators of men shot putters can serve as an example of this trend (ABRAMOVA and others 1994). It is this rapprochement of physiological indicators that explains the rapid progress made by women in many athletic events.

The specific details of specialized nutrition for athletes, taking into account the specifics of the female organism, are based on the pyramid type model (Figure 1). Only a rational combination of all three elements of the pyramid can provide the

### Table 1: Sexual dimorphism of some morpho-functional characteristics of athletes (according to YORDANSKAYA 1995 with modifications)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>177.5</td>
<td>164.8</td>
</tr>
<tr>
<td>Weight</td>
<td>71.9</td>
<td>54.6</td>
</tr>
<tr>
<td>Muscle mass [kg/%]</td>
<td>38.96/54.2</td>
<td>28.99/53.1</td>
</tr>
<tr>
<td>Fat mass [kg/%]</td>
<td>6.49/8.9</td>
<td>5.67/10.2</td>
</tr>
<tr>
<td>Arterial pressure systolic [mmHg]</td>
<td>118-112</td>
<td>97-102</td>
</tr>
<tr>
<td>Arterial pressure diastolic [mmHg]</td>
<td>74-77</td>
<td>60-62</td>
</tr>
<tr>
<td>Blood [l]</td>
<td>5.6</td>
<td>4.3</td>
</tr>
<tr>
<td>Erythrocytes [10^{12}/l]</td>
<td>4.0-5.0</td>
<td>3.9-4.9</td>
</tr>
<tr>
<td>Haemoglobin [g/l]</td>
<td>130-160</td>
<td>120-140</td>
</tr>
<tr>
<td>Creatinin [mmol/l]</td>
<td>8-31</td>
<td>6-29</td>
</tr>
<tr>
<td>Creatinin [mmol/l]</td>
<td>61-115</td>
<td>53-97</td>
</tr>
<tr>
<td>Urea [mmol/l]</td>
<td>3.3-7.5</td>
<td>2.7-7.3</td>
</tr>
<tr>
<td>Testosterone [mmol/l]</td>
<td>9.0-38.3</td>
<td>&lt;4.3</td>
</tr>
</tbody>
</table>
Figure 1: The pyramid of sport nutrition

most effective medical, biological support for the
training of top athletes.

There has recently been a clarification of the
terms used in the complex subject of sports
nutrition. Sports nutrition is a kind of applied
discipline at the junction of several sciences, such as
physiology, biochemistry and pharmacology. At
the first level of the pyramid we speak about
nutritional components and major nutritional
substances (proteins, fats, carbohydrates, vita-
mins and minerals). At the second level we use
the term "substrate specialized products" (those
high in protein, protein with added carbohy-
drates, protein-carbohydrates, crystallized amino
acids, creatines). At the third level the term "spe-
cialized supplements" is most appropriate. The
introduction of this term, instead of the previ-
ously used "preparations", indicates the natural
basis of these supplements, which are not manu-
factured doping stimulators. The following groups
of specialized nutritional supplements are most
important regarding problems connected with
female physiology:
- lipotropic factors (based on micro cellulose,
enzymatic fat burners). Use of hypobulermic
products of the narcotic analgesic group
(phepranone type) is inadmissible;
- anabolyzing agents (ecdisterone - cf. Figure 2-,
tribusponin, adaptogens such as leusea);
- contraceptives (progesteronic, oestrogenic,
combined). In regard to the use of 19-NOR-
ethisterone, doctor's consultations are compul-
sory, and any preparation containing it should
be reported.

Some approaches to the solving of
problems of women athletes' specialized nutrition

(1) Increasing the muscle mass while decreasing
the fat layer.
The solution to this problem is to make body
fat oxidize itself through aerobic strength
work, together with a relative deficit of car-
bohydrates and the stimulation of muscle
protein synthesis with a complex of protein
and amino acid substrate products, B group
vitamins and anabolyzing agents, such as
ecdisterone (the so-called "triad" method) -
see Figure 3.

(2) Regeneration of the functional state of the
organism of a female athlete in the post-
natal period and during breast feeding.
Pregnancy, child birth and breast feeding cause a dramatic physiological, hormonal and psychological restructuring of a woman athlete's organism, which is accompanied by a distinct lack of adaptation to physical loads. This lack of adaptation is manifested by a substantial growth of body mass, with the muscle mass decreasing drastically (by 100%) and the fat mass growing by the same amount.

Solution to the problem are:
- initial aerobic loads
- carbohydrates deficit, liptropic agents
- organism cleansing
- aerobic strength bloc – see (1).